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TRENDS AND OPTIONS IN THE DISPOSAL OF LAUNCH VEHICLE ORBITAL STAGES

Nicholas L. Johnson

Orbital Debris Program Office, NASA Johnson Space Center, Houston,
Texas, USA

Abstract: An increasing number of agencies and organizations around the world provide guidelines for the disposal of launch vehicle stages placed in Earth orbit. The limitation of orbital lifetime following the satellite delivery mission, particularly in low Earth orbit, is viewed as one of the most important space debris mitigation measures. For higher altitude missions, orbital stages may be maneuvered into more rapidly decaying orbits or may be left in longer-term disposal orbits. This paper summarizes the recent disposal practices of all launch vehicle types and evaluates their compliance with existing national standards. Although the owners and operators of some satellite systems, e.g., Iridium and Globalstar, have levied orbital stage disposal requirements on launch service providers, in general, insufficient attention and communication is given to this topic. Sun-synchronous and geosynchronous missions may pose some of the most difficult challenges for the responsible disposal of orbital stages. A variety of disposal options are normally available, some of which may even influence the design of the spacecraft to be deployed. Also at issue is whether normal launch vehicle propellant reserves can be relied upon for post-mission disposal of orbital stages.